

spirit and enthusiasm displayed throughout proved how greatly the value of the course was appreciated. When it is remembered that, with scarcely an exception, these teachers had hitherto never used the microscope, never dissected a single organ or organism for themselves, nor seen one properly dissected, the advantage gained by the experience they have now obtained, even if only a portion of what was condensed into six weeks' work remains with them, is something very considerable, for it is something of a *new kind*, a form of knowledge which they had entirely failed to obtain before.

It is exceedingly interesting to find that no difficulty was experienced in going over all these matters in a class which was not confined to men alone, and most heartily do we hope to see in the future a larger proportion of women engaged in this and other branches of scientific study. Those who imagine that women have some innate incapacity, and assert that if admitted to classes now limited to men they would be unable to profit by them, or would hinder the progress of the class by the greater attention they would require in order to keep them to the level of male students, may take this fact to heart—one of the microscopes offered as a prize for the best work done, and the best record of the lectures and the day's work, was adjudged simply upon the merits of her reports and work to the one lady among the thirty-nine students who formed the class. On the other hand, this fact will probably stimulate that unavowed feeling, akin to the trades-unions' hostility to competition, which is the cause of the arbitrary exclusion of one half of the community from our greatest educational institutions. E. R. L.

MAGNUS'S BONES OF THE HEAD OF BIRDS

Untersuchungen über den Bau des Knöchernen Vogelkopfes. Von Dr. Hugo Magnus, Assistentarzt an der Klinik des Herren Prof. Dr. Förster, zu Breslau. Mit sechs Tafeln. (Leipzig: Engelmann, 1870; pp. 108. London: Williams and Norgate.)

THIS work is a systematic description of the form, structure, and relations of the various bones of the head of birds. Each bone is taken separately, and the chief varieties it presents in the several sub-classes are described, and are illustrated by carefully drawn plates. In here giving a brief notice of the work, we need scarcely say that the details of the several bones in the adult state are very well and clearly given, and the author has had opportunities, of which he appears to have thoroughly availed himself, of studying and comparing the skulls of a large number of birds. The mode in which the variations from typical structure are given is instructive and accurate. We will give an extract to show the mode in which he deals with the subject, and select a part of his account of the squama of the Temporal:—

"The squama of the Temporal Bone (Squama, Scheitelbein, Geoffroy) closely resembles that of Mammals in its form and position. It is an elongated, scale-like bone situated upon the lateral wall of the skull above the tympanic cavity, and is posteriorly in contact with the occipital, above with the parietal or temporal, and anteriorly with the great wing of the sphenoid, with which, as we have already seen, it frequently unites to form the posterior orbital process. The external convex surface of the squama for the most part enters into the formation, sometimes more and sometimes less, of the temporal fossa, especially in the long-billed marsh and aquatic birds. From the processus orbitalis posterior a semicircular line runs upon or

around the squama, separating it with its striæ or ribs from the planum temporale. Near the anterior border of the squama, and usually below the posterior orbital process, a process shoots forth from its surface, which is the Processus Zygomaticus of Carus and the temporal process of Köstlin. This in some birds, as in the Larks, Parrots, and Fowls, is tolerably well marked, and fuses with the processus orbitalis posterior. In the singing birds, this process is very variable in size; in Thrushes, Sylviadæ, Motacillidæ, and Hirundinidæ, it is rather feebly developed, resembling a small blunt head. In the Fringillidæ it is developed into a slender rod, as it is also in Edolius, and (though to a less degree) in Lanius. In the Paridæ it forms a broad lamina. In the Corvini, it is considerably developed; while in the Falcons it appears to be entirely absent. In Owls it is slender and acicular. In the Woodpeckers it is very large, and occupies a special groove of the Quadrate bone. In the marsh and aquatic birds it approximates very closely to the articular surface of the os quadratum, and is for the most part of very small size." He then proceeds to describe the internal surface of the squama, and its junction with other bones to form the tympanic cavity.

The principal defects of the book are obviously that the author has little acquaintance with the history of the embryological development of the class of birds generally, and does not appear to have studied the serial homologies of the several bones in other classes.

As an instance of the former defect, we may note that Herr Magnus maintains with Nitzsch that the os dentale, or median portion of the lower jaw, is developed from a single point of ossification. "I have never," he says, "been able to discover the presence of two nuclei, even in the youngest animals I have examined, nor any trace of a suture." We would refer to Mr. Parker's paper on the head of the fowl, as clearly showing the double nature of this bone, though no doubt the two parts early coalesce. Taking the ethmoid bone again, we find Dr. Magnus describing it rightly as a cranial bone, or rather as one belonging to his animal sphere. He notices the singular modification in form it undergoes throughout the whole class, and observes that it is a thin bony plate lying between and in front of the globes of the eye. The anterior portion, he goes on to say, situated in front of the eyes, and provided with lateral processes that shut off the nasal from the orbital cavities, may be regarded as the labyrinth of the ethmoid. And then comes the remarkable statement that "the plate extending backwards from this and separating the two orbital plates from each other is the *crista galli*, whilst the short plate extending forwards into the cavum narium represents the lamina perpendicularis." This scarcely appears to us to be an accurate representation. The *crista galli* is to all intents and purposes an intracranial projection of bone, we might even consider it to be a portion of the falx cerebri which has undergone ossification, and such result must be above the plane of the canals for the nasal branch of the fifth; in point of fact, it may be seen in all birds in a rudimentary form between the two passages for the olfactory nerves. (See note to Mr. Parker's paper "On the Structure of the Skull of the Common Fowl," Phil. Trans. 1869, p. 762.) The septum between the two orbits is chiefly and not to a small extent only, formed by the os perpen-

dicular or lamina papyracea. Putting aside the references elsewhere made to this point in the course of the descriptions of the bone, we must praise the very full account that is given of its relations in the different classes of birds, proving not only that the means of investigation at Dr. Magnus's disposal are extensive, but that he has made excellent use of them.

As an example of the second point, on which we have ventured to criticise Dr. Magnus's work, we may refer to the entire section on the bone to which he has applied the term Paukenbein, or Tympanic, bone, which, in part at least, corresponds to Mr. Parker's Basi-temporal, and the relations of which the latter writer has worked out so well. Its nature is essentially misunderstood by Dr. Magnus, who appears to have drawn his conclusions from heads examined at too late a period of development, whilst he scarcely makes any reference to its homologies, so important in determining a difficult and disputed relation of this kind.

H. P.

OUR BOOK SHELF

The Elements of Plane and Solid Geometry. By H. W. Watson, M.A. (Longmans, Green, and Co.)

THIS is one more Text-book of Geometry. It adopts completely the general principles of the geometrical reformers in England, in the classification of the rems according to their subjects, the free use of super-position, the separation of problems from theorems, the art from the science, and the avowedly arithmetical treatment of proportion. It is distinguished from most that have preceded it by its greater length, especially in its treatment of ratios, by its somewhat wider range of illustration, and its comprehending the elements of solid geometry. But the book is disappointing. A well-trained and well-read mathematician, with plenty of experience in teaching, and we imagine plenty of leisure for writing, ought to turn out a better book. In a text-book which does not profess to be original in its matter, the arrangement and manner are of the first importance; and in both these respects the book in our judgment fails, and fails openly. The large number of miscellaneous propositions with which several of the books open give a real confusion to the whole volume. And it would be easy, if space permitted, to show that the arrangement is unnatural in some important points. Moreover, some of the demonstrations are very inelegant, such as Book I., pp. 11, 17, and Book II., pp. 12, 13; indeed the latter pair are more than inelegant.

On the whole, therefore, we believe that the book before us, though not without merit, is not a very valuable addition to geometrical reform. It seems to show very clearly what the reformers must aim at, and take infinite pains to achieve: the establishment and recognition of a standard syllabus of geometry. When this is agreed upon, we shall see better text-books than have yet been written.

Victoria. (1) *Mineral Statistics of Victoria for the year 1870.* Presented to both Houses of Parliament by his Excellency's command. (Melbourne: By authority: John Ferres, Government Printer.)—(2) *Reports of the Mining Surveyors and Registrars.* Quarter ending March 31, 1871. (Melbourne: By authority: John Ferres, Government Printer.)

THESE reports are models of what such statistical reports should be; the tables are methodically arranged, easy of reference, and apparently exhaustive; the printing would be creditable even to a London printer. In the former, besides the interesting summary and the appendices, there are fifty-three admirably constructed tables, setting forth the statistics, from every possible point of view, of the

mining operations in all the districts, divisions, and subdivisions of Victoria for the year 1870. Of course the statistics relate mainly to gold, the metal most sought after; but all obtainable information is likewise given with reference to whatever other mineral produces are found in the province—silver, tin, copper, antimony, lead, cobalt, manganese, coal, &c. Every means has been taken to make the statistics reliable, and the result, with regard to gold, is that there has been a falling off of the produce in 1870, as compared with 1869, to the extent of upwards of 40,000 oz., which decrease is largely accounted for by the heavy and unprecedented floods of 1870 interrupting the mining operations, the decrease in the number of mines, and the falling off in the yield of gold from several of the deeper alluvial mines. It is stated that during 1870 several scientific gentlemen volunteered to deliver to the miners gratuitously lectures on subjects connected with mining, but received no encouragement from the district authorities, who seem not to have thought it worth their while to provide a room. The interests of science are, however, by no means neglected. We learn from these reports that during last year more than 800 groups of minerals, rocks, and fossils, were added to the collection of the mining department. Efforts have also been made to obtain specimens of the mineral products of other countries in exchange for native products. Another colony is now likely to reap a rich reward, as already many specimens have been sent both from Europe and America. We are glad to learn that Dr. Von Mueller is preparing a report on the large collection of native fossils which has been made. The second report, for the quarter ending March 31, 1871, is considerably more interesting than the former, in a scientific point of view. Besides full and valuable mining statistics, there are two appendices: (A) "Notes on the Rocks and Minerals of the Owen's District," with a sketch map, by Mr. E. J. Dunn, containing much valuable information on the geology of the district; (B) an interesting paper containing succinct observations on what the author, Ferd. Von Mueller, Director of the Melbourne Botanic Garden, considers a new genus of Fossil Coniferæ, to which he has given the name *Spondylostrobus*. It is allied to *Cupressinites* of Bowerbank. We are sorry we have not space to copy the author's description. The validity of the genus, Mr. Mueller declares, rests chiefly on the extraordinary development of the columella, if so it may be called; this columellar portion forming indeed the main body of the fruit, the so-called new genus differing in this respect from all other cupressineous genera living as well as extinct. The paper is illustrated by a beautifully executed lithograph, containing several coloured figures, natural size, of the fossil, and also by a plan of the field, and sections of the strata in which it is found. We have much pleasure in commending these interesting, and on the whole, encouraging reports, to the notice both of statisticians and geologists.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.]

Pendulum Autographs

HAVING read with much interest Mr. Hubert Airy's communication to NATURE (No. 94), on "Pendulum Autographs," I wish to say a word on the compound pendulum long ago devised, I believe for the first time, by Prof. Blackburn, of Glasgow.

I construct the pendulum as follows:—A piece of soft iron wire, about $\frac{3}{16}$ th of an inch diameter, is fastened by its ends to two points in the ceiling, and a heavy bob is hung from its middle point. A second wire of the same length is similarly attached to the ceiling and to the bob, so that the wires form two superposed isosceles triangles with the line between the suspension points for their common base. A light deal rod about the same length, more or less, as the distance of the suspension